

ATEC

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Transforming to Enable Success





ATEC

Transforming to Enable Success

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Front cover photo of Stryker was taken at Yuma Proving Ground by Gary Fesperman. Inside cover photo taken at Aviation Technical Test Center by Paul Reynolds.



Testing and Evaluation: Positioned to Support the 21st Century Army

*by MG Robert E. Armbruster
Commanding General
U.S. Army Test and Evaluation Command*

The United States Army Test and Evaluation Command (ATEC), headquartered in Alexandria, Virginia, is a relatively new organization. However, its precursors are steeped in history and the formation of ATEC in 1999 is just the latest step in the evolution of Army testing and evaluation.

With all testing and evaluation under one umbrella, ATEC is in a unique position to plan and execute incremental developmental test plans that are event driven and focused on preparations for successful operational tests. With the Army moving swiftly toward Transformation, ATEC's role is even more critical today. We started the Transformation journey with the testing of the Stryker wheeled vehicle and by developing strong relationships with the acquisition community. Through resulting rapid feedback, we are able to accelerate the developmental cycle to support the Army's Future Combat Systems efforts and to meet the threats of the 21st Century.

Please take some time and read about our test facilities and abilities. They are awesome. ATEC has the capability to assist the materiel development community in taking a program from developmental testing all the way through the operational testing that will lead to a final fielding decision.

ATEC is partnering with industry and Program Managers to look beyond the platform level and test the limitations and capabilities of warfare's future system-of-systems. ATEC is continuously evolving its organization and its methodologies to meet the needs and challenges of the Army acquisition process—to ensure the Army fields systems that meet the needs of the Warfighter.

ATEC—Transforming to Enable Success

History

On November 18, 1998, the Vice Chief of Staff of the Army approved consolidation of developmental and operational testing. That decision led to the redesignation, on October 1, 1999, of the Operational Test and Evaluation Command (OPTEC) to ATEC.

Central to the consolidation was ATEC assuming overall responsibility for all Army developmental and operational testing. The Test and Evaluation Command (TECOM) became a major subordinate command of ATEC and was redesignated the U.S. Army Developmental Test Command (DTC), with DTC headquarters remaining at Aberdeen Proving Ground, Maryland. Also, the Test and Experimentation Command (TEXCOM) was redesignated the U.S. Army Operational Test Command (OTC), with OTC headquarters remaining at Fort Hood, Texas. The third ATEC subordinate command that was redesignated encompassed both the Operational Evaluation Command and the Evaluation Analysis Center, which were combined to form the new U.S. Army Evaluation Center (AEC), completing the earlier decision to move developmental and operational evaluation into a single, integrated command.

Under the consolidation, ATEC was also given responsibility for installation management of White Sands Missile Range, New Mexico; Dugway Proving Ground, Utah; and Yuma Proving Ground (YPG), Arizona. On October 1, 2002, the respective Installation Management Activity regional office assumed that responsibility.

ATEC also took command of Aberdeen Test Center (ATC) at Aberdeen Proving Ground; Redstone Technical Test Center at Redstone Arsenal, Alabama; Aviation Technical Test Center at Fort Rucker, Alabama; Electronic Proving Ground at Fort Huachuca, Arizona; Cold Regions Test Center at Fort Wainwright, Alaska; and Tropic Regions Test Center, headquartered at YPG with testing in Hawaii and other locations.

Since its formation, ATEC has played a major role in Army Transformation. In December 1999, ATEC was in the field evaluating medium-weight armor at Fort Knox, Kentucky, during the Platform Performance Demonstration; it conducted the Interim Armored Vehicle Bid Sample Event at ATC; it compared the M113 and the Stryker at Fort Lewis, Washington, for Congress; and it conducted operational tests of the Stryker in the summer of 2003 at Fort Knox.

ATEC's Wide Range of Customers

- The American Soldier
- Congress
- Chief of Staff and Vice Chief of Staff, U.S. Army
- Joint Chiefs of Staff
- Army Deputy Chief of Staff for Operations and Planning
- Assistant Secretary of the Army for Acquisition, Logistics, and Technology
- Program Executive Officer or Program Manager
- Director of Operational Test and Evaluation
- Undersecretary of Defense, Acquisition, Technology, and Logistics
- Director of Information Systems for Command, Control, Communications, and Computers
- Training and Doctrine Command
- Army Materiel Command
- U.S. Navy
- U.S. Air Force
- U.S. Marine Corps
- Ballistic Missile Defense Office
- Deputy Undersecretary of the Army for Operations Research
- Defense Threat Reduction Agency
- Foreign Countries

The editorial content of this publication is the responsibility of the Public Affairs Office, Headquarters, ATEC. The views and opinions expressed do not necessarily reflect those of the Department of Defense. To comment, contact USATEC, CSTE-PA, 4501 Ford Ave., Alexandria, VA 22302-1458.

Mission

ATEC plans, conducts, and integrates developmental testing, independent operational testing, independent evaluations, assessments, and experiments **in order to provide essential information to decision makers.**

Vision

An ATEC that is the premier test and evaluation organization within DoD—**valued by customers and decision makers for providing essential information** that ensures war-fighters have the right capabilities for success across the entire spectrum of operations.

Crest

The grid lines represent scientific method and verification in the testing programs conducted by the Command. Black and silver denote the precision and clarity required in carrying out these programs. The wreath stands for high ideals. The balance scale denotes objectivity and represents the testing and evaluation mission of the Command. Blue stands for truth, and gold for excellence.



Patch

The Command's mission, to seek truth through testing and experimentation, is symbolized by the triangle, or fulcrum, balancing a bar and sun. The bar and triangle represent a scale; the sun signifies the search for knowledge, enlightenment, and high ideals. Yellow indicates the precious metal gold and represents "the worth of quality assurance of tested products." Dark blue alludes to the sky and space, suggesting the possibilities and discoveries of the future. The red sword characterizes the individual soldier, whose combat preparedness is aided by the data and information products the organization provides. The white expresses the Command's search for the truth and sterling quality of the products produced.

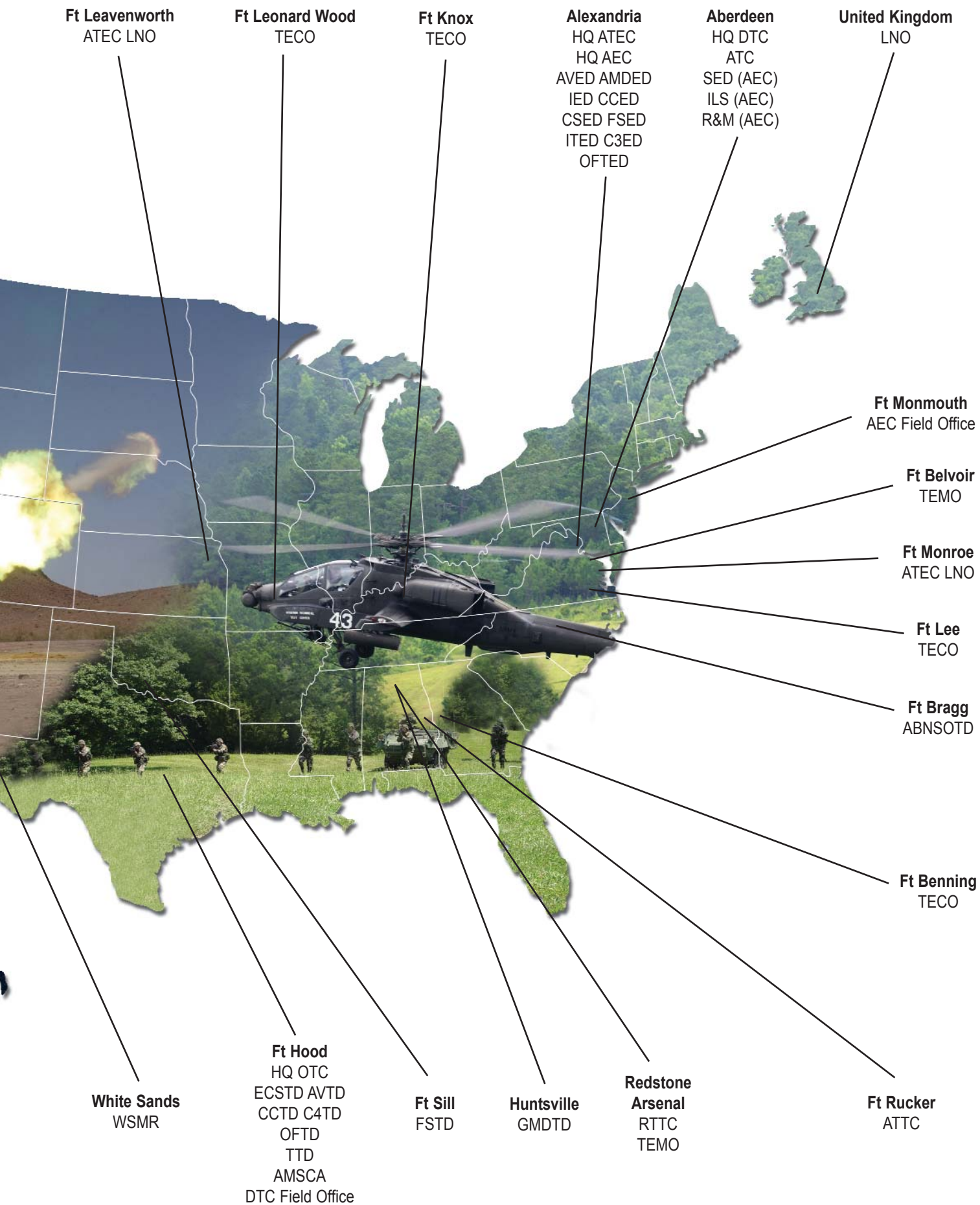


Organization

ATEC is located throughout the continental United States, Alaska, and Hawaii. During any given day, approximately 1,100 tests are ongoing in the U.S. and around the world. This map gives an indication of the size and diversity of the organization. Below is an explanation of the organizations shown on the adjoining map.

ABNSOTD	Airborne and Special Operations Test Directorate
ADATD	Air Defense Artillery Test Directorate
AMDED	Air and Missile Defense Evaluation Directorate
AEC	Army Evaluation Center
AMSCA	ATEC Mission Support Contracting Activity
ATC	Aberdeen Test Center
ATEC	Army Test and Evaluation Command
ATTC	Aviation Technical Test Center
AVED	Aviation Evaluation Directorate
AVTD	Aviation Test Directorate
C3ED	Command, Control, and Communications Evaluation Directorate
C4TD	Command, Control, Communications, and Computers Test Directorate
CCED	Close Combat Evaluation Directorate
CCTD	Close Combat Test Directorate
CRTC	Cold Regions Test Center
CSED	Combat Support Evaluation Directorate
DPG	Dugway Proving Ground
DTC	Developmental Test Command
ECSTD	Engineer and Combat Support Test Directorate
EPG	Electronic Proving Ground
FSED	Fire Support Evaluation Directorate
FSTD	Fire Support Test Directorate
GMDTD	Ground-Based Midcourse Defense Test Directorate
HQ	Headquarters
IED	Intelligence Evaluation Directorate
IEWTD	Intelligence and Electronic Warfare Test Directorate
ILS	Integrated Logistics Support
ITED	Information Technology Evaluation Directorate
LNO	Liaison Officer
OFTED	Objective Force Transformation Evaluation Directorate
OFTD	Objective Force Test Directorate
OTC	Operational Test Command
R&M	Reliability and Maintainability
RTTC	Redstone Technical Test Center
SED	Survivability Evaluation Directorate
TECO	Test and Evaluation Coordination Office
TEMO	Test and Evaluation Management Office
TTD	Transformation Technology Directorate
TRTC	Tropic Regions Test Center
WSMR	White Sands Missile Range
YPG	Yuma Proving Ground





Evaluations

U.S. Army Evaluation Center—Supporting Army Transformation and the 21st Century Soldier

When testing is finished, the U.S. Army Evaluation Center (AEC) is the organization that writes the final report used by the decision makers to determine whether a new or enhanced system will become part of the Army's 21st Century arsenal. In this role, AEC is deeply involved in the Army Transformation effort.

AEC gets involved early in the acquisition process to ensure that Test and Evaluation (T&E) programs, strategies, and objectives are consistent throughout the acquisition program.

Since T&E results figure prominently in the decisions reached at design and milestone reviews, early T&E involvement in the acquisition process serves to add value to the final product of any acquisition program. AEC evaluates and reports on each system's effectiveness, suitability, and survivability to the Army senior leadership and, when requested, to Congress.

*AEC members will
evaluate the
airworthiness of the
RAH-66 Comanche
helicopter.
(U.S. Army Photo)*



Headquartered in Alexandria, Virginia, AEC has sites in four states. There are more than 228 military and civilians in Alexandria, and approximately 193 at Aberdeen Proving Ground, Maryland. AEC also maintains a presence at Fort Monmouth, New Jersey, and Fort Bliss, Texas.

AEC comprises eight Battlefield Operating System Evaluation Directorates: Air and Missile Defense; Aviation; Close Combat; Combat Support; Fire Support; Information Technology; Intelligence; and Command, Control, and Communications. It also has the newly formed Objective Force Transformation Directorate and three other directorates called "ilities": Integrated Logistics Support, Reliability and Maintainability, and Survivability.

AEC's vision is team focused as it strives "to maintain its role as the premier evaluation organization in the Department of Defense, performing credible, comprehensive, tailored evaluations and analysis that satisfy customer's requirement in support of the soldier."

AEC was established under the ATEC umbrella in 1999 by combining the resources of the Operational Evaluation Command and the Evaluation Analysis Center. From the initial concept of a system to its placement in the hands of the Soldier during the operational test phase, AEC personnel are involved every step of the way by providing valuable insight and feedback to materiel developers throughout the acquisition lifecycle. Working in coordination with the U.S. Army Developmental Test Command (DTC), AEC monitors a system to determine whether it is meeting developmental expectations. This effort assists in discovering any potential problems early—when fixes are easier and less costly to the materiel developer.

AEC plays a major role on the ATEC Systems Team (AST), which is formed upon notification of a new system. The lead major subordinate command of ATEC will identify the chair for the new system. The AST coordinates ATEC input into the T&E Working Integrated Product Teams (T&E WIPTs). The AST chair serves as the lead voice and ensures that at least one ATEC representative is present at the T&E WIPT meetings.

AEC personnel chair approximately 95 percent of all ASTs, which include other AEC members and Subject Matter Experts from DTC and the U.S. Army Operational Test Command. AEC participates in operational tests by observing the conduct of test execution, participates in Data Authentication Groups, and on an as-needed basis makes

recommendations to the Test Directorate to modify test execution. For major system programs, AEC's field grade military evaluator is the AST chair.

When a test is finished, AEC produces the System Evaluation Report (SER), an unbiased, objective account of system performance. The AEC evaluator then briefs the report through the chain of command with a recommendation to the Commanding General of ATEC. The recommendation can be for full fielding, rejection of the system, more development, or additional testing.

The Commanding General then takes his recommendation to the senior leadership. Those leaders who make milestone decisions, some at the Department of Defense level, use AEC's SER.



AEC evaluators are critical in assessing the Patriot Air Defense System Advanced Capability-3 (PAC-3) system. (U.S. Army Photo)

Some of the many systems with which AEC has been involved recently include:

- Future Combat Systems
- Stryker Family of Armored Vehicles
- Maneuver Control System
- Force XXI Battle Command Brigade and Below
- Integrated System Control
- All Source Analysis System Remote Workstation
- Comanche (RAH-66)
- Land Warrior
- Ground-Based Midcourse Missile Defense
- Warfighter Information Network–Tactical
- Joint Tactical Radio System
- High Mobility Artillery Rocket System
- M1A2 Abrams SEP
- M2A3 Bradley Fighting Vehicle, fully digitized
- TOW Fire and Forget Missile System
- Tactical Unmanned Aerial Vehicle
- Patriot Air Defense System Advanced Capability-3
- Theater High Altitude Area Defense
- Advance Field Artillery Tactical Data System

A major part of AEC's mission is evaluating survivability and live-fire testing of systems, such as this M1A2 Abrams Main Battle Tank at Aberdeen Test Center in Maryland. (Photo courtesy of ATC)

AEC travels the world to evaluate a proposed system's value to the Army or, following a joint test, to other branches of the service. AEC customers also include the Navy, Air Force, and Marine Corps. AEC also seeks to achieve greater efficiency and effectiveness through modeling and simulation. Increased system complexity and the high costs of system-level testing have forced the Army to continually explore new analytical techniques. The use of modeling and simulation in the evaluation of systems, concepts, and designs continues to grow at AEC.

As the U.S. military continues its fast-paced efforts to stay on top of the newest technology and the U.S. Army moves rapidly forward to remain the greatest military organization in the world, AEC will be there watching, analyzing, reporting, and helping the Army complete its critically important materiel acquisition mission.

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Army senior leadership will receive evaluation reports from AEC on the Stryker Family of Armored Vehicles. (U.S. Army Photo)



Developmental Testing

U.S. Army Developmental Test Command— Offering a Full Range of Test Services

The U.S. Army Developmental Test Command (DTC), the developmental test arm of ATEC, is the Army's premier materiel developmental testing organization for weapons and equipment.

With the largest, most diverse array of testing capabilities in the Department of Defense (DoD), DTC tests military hardware of every description under precise conditions across the full spectrum of arctic, tropic, desert, and other natural or controlled environments on highly instrumented ranges and test courses.

DTC offers a full range of test services, including providing unbiased test data on the technical feasibility of early concepts, determining system performance and safety, assessing technical risks during system development, confirming designs, and validating manufacturers' facilities and processes at both system and component level. Its testing services are extended to all of DoD, other federal agencies, state and local governments, foreign and allied governments, and private industry.

DTC works closely with Program Managers and the acquisition community to support acquisition programs through efficient and cost-effective test planning, including streamlining the test program when feasible. As an active member of Integrated Product Teams that include testers and evaluators, as well as Program Managers and executive officers, DTC supports the development of the acquisition strategy, statement of work, performance specification, and test/simulation execution strategy.

Through DTC's Virtual Proving Ground initiative, new test technology investments are reducing costs by reducing test scope, prototypes, and workforce requirements. The integration of the model-test-model process allows design changes to be made early when most cost effective.

Under its "technology infusion" concept, DTC is positioning itself to provide cost-effective, state-of-the-art test support to the transforming Army's Objective Force. As a result, DTC testing is transforming to reflect the reality of increasingly



sophisticated military systems linked together through a common communications network. Our investments for new test technologies are dedicated to supporting the distributed testing of technically sophisticated network-centric systems at multiple test sites.

In addition to conducting rigorous performance tests on weapon systems and materiel, DTC tests equipment and systems under a variety of conditions and possible uses to ensure the safety of Soldiers and operators. Test personnel report safety risks and in some cases recommend use restrictions that enhance safety. Validating the safety of systems and equipment is the key thrust of DTC's safety verification program, and it is a critical part of the DTC test mission.

DTC accomplishes its mission at several test centers, including White Sands Test Center at White Sands Missile Range, New Mexico; West Desert Test Center at Dugway Proving Ground, Utah; Yuma Test Center at Yuma Proving Ground (YPG), Arizona;

Aberdeen Test Center at Aberdeen Proving Ground, Maryland; Aviation Technical Test Center (ATTC) at Fort Rucker, Alabama; Cold Regions Test Center at Fort Wainwright, Alaska; Electronic Proving Ground at Fort Huachuca, Arizona; Redstone Technical Test Center at Redstone Arsenal, Alabama; and Tropic Regions Test Center, headquartered at YPG and providing test services in Hawaii and other tropic locations throughout the world.

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*DTC tests everything from boots to missiles. Here a JAH-64D undergoes testing by DTC's ATTC while a highly modified T-34C, "Pace" BC-40, is used to calibrate the Longbow's airspeed system.
(Photo by Paul Reynolds)*

Virtual Proving Ground Transforms Test and Evaluation As Army Looks to Future Combat Systems

The Developmental Test Command's (DTC's) Virtual Proving Ground (VPG) is an investment in the future of the Army. By acquiring and developing state-of-the-art modeling and simulation (M&S) technologies across its test centers, and buttressing these technologies with high-performance computing and high-speed communications, DTC is developing 21st Century test capabilities. The VPG enables DTC to minimize testing that is destructive to items under test and save test customers substantial money, time, and resources. Although testing systems in the synthetic environments of the VPG cannot entirely replace testing them in the real-world environment under actual operational conditions, the VPG can provide a wealth of data needed to assess system effectiveness and focus test programs.

Integral to Army Transformation is the distributed warfighting capability of Future Combat Systems (FCS). The VPG will support distributed testing by linking together multiple test centers and multiple capabilities across the United States—including defense contractor capabilities, technical testing sites, and sites where operational testing takes place with Soldiers in maneuver scenarios.

The VPG program, in conjunction with the Versatile Information System Integrated On-Line, will include the placement of improved sensors and instrumentation on various FCS components to acquire the full range of data about system performance. This instrumentation must be controlled and monitored from afar. Testers and test customers should be able to query the instrumentation and obtain test data from systems under test as rapidly as possible via satellite links, cellular links, or high-speed data links.

The Synthetic Environment Integrated Test-Bed (SEIT) is a vital VPG component that will provide a realistic, standard, and high-resolution synthetic environment. SEIT is being developed to enhance the effectiveness and efficiency of traditional testing through a more effective, collaborative use of M&S capabilities among DTC test ranges and other Department of Defense organizations. Matured engineering-level M&S capabilities that represent aspects of the operational environment will be used to generate stimuli for testing the FCS components, platforms, and system-of-systems.

DTC's Inter-Range Control Center will integrate SEIT's diverse capabilities with other engineering models in distributed testing and extend the use of these synthetic environments and test tools throughout the Army and in other cross-domain applications. In conjunction with the FCS program, DTC is also developing a framework for M&S architecture that will ensure that M&S requirements are identified in an integrated and collaborative environment.

DTC's virtual capabilities are by no means limited to the military. At Aberdeen Proving Ground, Maryland, for example, the Aberdeen Test Center's (ATC's)

ATC's Roadway Simulator is the largest facility of its kind in the United States. When completed, it will be capable of testing multi-axle trucks. (Photo courtesy of ATC)



Roadway Simulator has elicited interest from potential users as diverse as the U.S. Department of Transportation, university engineering departments, and vehicle manufacturers. With the aid of a computer-controlled, steel-band track that can be set to run beneath a vehicle's tires at varying speeds—as well as computer programming to create a variety of other driving conditions such as grades, curves, bumps, and braking—the simulator enables testers and researchers to collect data on vehicle characteristics such as braking, steering, handling, stability, fuel economy, emissions, power-train performance, vibration, and ride quality. The simulator is designed to provide this type of data in hours rather than months, significantly reducing testing time and costs.

DTC's Redstone Technical Test Center at Redstone Arsenal, Alabama, employs VPG technology to test weapons such as the Javelin missile in a "hardware-in-the-loop" mode. The Electro-Optical Sensor Flight Evaluation Laboratory at Redstone provides the means to test missile guidance and control systems in a non-destructive, simulated environment. Its proximity to the Electro-Optical Target Acquisition System Evaluation Laboratory and a high-speed fiber-optic cable allows closed-loop, non-destructive testing of target-acquisition sensors and fire-control subsystems.

Numerous other VPG capabilities exist at other DTC test centers, and the Command continues to invest a significant percentage of its funding into acquiring new technologies to meet the needs of the Army and FCS.

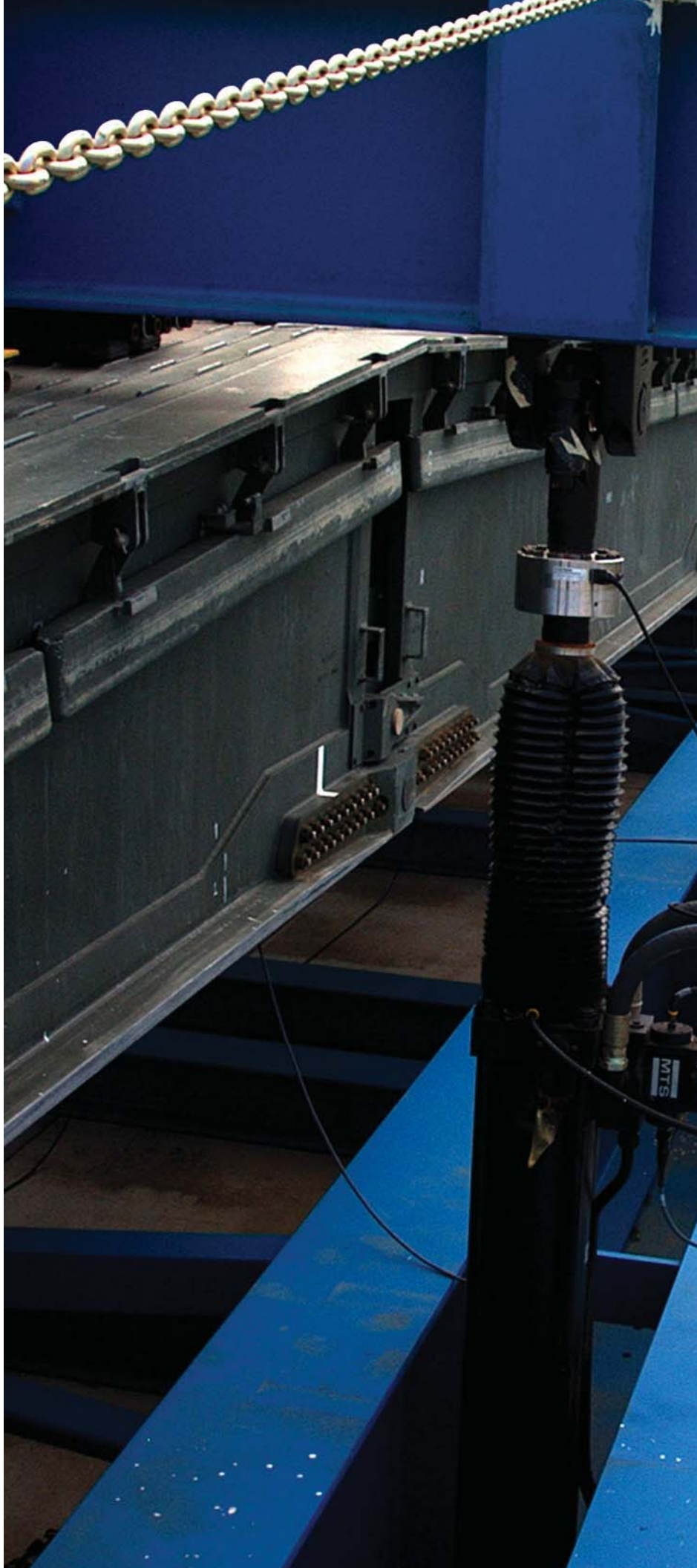
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*ATC's Bridge Crossing Simulator uses computer-controlled hydraulic actuators to simulate the stresses and strains that vehicles produce when traveling over a bridge.
(Photo by Mike Cast, DTC)*



Aberdeen Test Center

Introduction

Aberdeen Test Center (ATC), located next to Chesapeake Bay on Aberdeen Proving Ground in northern Maryland, is the Department of Defense's (DoD's) lead agency for land-combat, direct-fire, and live-fire vulnerability testing. ATC is a multipurpose Test Center with diverse capabilities. Since World War I, the center has developed world-class testing, training, modeling, simulation, and experimentation facilities that give American Warfighters superior materiel and technology.

ATC supports testing worldwide using extensive mobile instrumentation, satellite communications, leading-edge technologies, and the wide-ranging expertise of a professional workforce. ATC also tests equipment and systems from other nations to support America's current and future national security requirements. As the Army's participant in the DoD's Test and Evaluation Pilot Program and an accredited federal laboratory, ATC is a leading center for technology transfer and dual-use partnerships with other DoD components, industry, and academia.

Capabilities

ATC's comprehensive capabilities, unique facilities, simulators, and models enable testing and experimentation from the subsystem level to the

entire system. The spectrum of military weapon systems and equipment tested at DoD's only temperate-climate, general-purpose proving ground includes:

- Armored vehicles
- Guns and ammunition
- Trucks
- Bridges
- Generators
- Night-vision devices
- Individual equipment (boots, helmets, etc.)
- Surface and underwater naval systems
- Non-lethal weapons

ATC also uses a cutting-edge information system and innovative data-acquisition technologies. Satellite and high-band communications, as well as database technology, enable customers to access their program information in real time through the World Wide Web. This enables test customers to make rapid, well-informed decisions throughout the life of a system.

Facilities and Support

To enhance test capabilities, ATC recently opened the Roadway Simulator and the Standardized Unexploded Ordnance (UXO) Technology Demonstration Site.

The Mobile Gun System and other variants of the Stryker have undergone rigorous developmental testing at ATC. (U.S. Army Photo)



The Roadway Simulator, the world's largest automotive test simulator, is an advanced system designed for a wide variety of performance, safety, and durability tests in a highly instrumented, well-controlled, and safe environment. This technology extends engineering-analysis and test envelopes and provides highly repeatable measurements. The simulator is located indoors, so weather conditions will not impact test results or schedules.

The Standardized UXO Technology Demonstration Site is a team effort spearheaded by the U.S. Army Environmental Center and supported by ATC and the U.S. Army Corps of Engineers Engineering Research and Development Center. It allows developers and users to gather data on the performance of detection technologies for UXO, compare results, and document realistic cost and performance information. The work done at this site will enable the Army to more quickly and cost-effectively address the issue of UXO cleanup, one of the biggest safety and environmental issues today.

The complete ATC Facilities/Capabilities Guide is available on CD-ROM upon request, and is also available at www.atc.army.mil.

Tests

Recent test programs include:

- Stryker Family of Armored Vehicles
- Family of Medium Tactical Vehicles Competitive Rebuy Program
- Commercial Aircraft Vulnerability
- Objective Individual Combat Weapons System
- Advanced Amphibious Assault Vehicle
- Land Warrior
- Heavy Dry Support Bridge
- Hybrid Electric Vehicle
- Future Combat Systems Novel Swing Chamber Gun

Future

ATC remains vital to the evolution of Army Transformation. ATC's unique combination of world-renowned facilities, high-tech instrumentation, and highly skilled and experienced workforce enables it to test technologies for tomorrow's Army.

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*A Bradley Fighting Vehicle plows through the water on one of the road test courses at ATC.
(Photo courtesy of ATC)*

Aviation Technical Test Center

Introduction

Aviation Technical Test Center (ATTC), located at Fort Rucker, Alabama, is the Army's foremost center for flight-testing and qualifying the airworthiness of airborne systems. ATTC tests aviation platforms and associated systems, and analyzes data, reports findings, and develops recommendations for airworthiness, system safety, and materiel release decisions. The Center provides continuing test and test-support services throughout the acquisition, modernization, and entire life of systems to help Warfighters succeed. Airworthiness qualification testing focuses on the handling qualities and performance of aerial vehicles in various flight conditions. These include forward flight, hover, vertical climb, and autorotation. The center also tests under various environmental conditions, including icing conditions.

Capabilities

ATTC experimental test pilots, flight-test engineers, and technicians provide customers with complete flight testing, test support, depot-level aircraft modification, fabrication, and prototyping services. Instrumentation packages are tailored to each flight test program. ATTC conducts testing throughout the life of aircraft, and performs aircraft evaluations at the Department of Defense's (DoD's) Major Range and Test Facility Bases (MRTFB), as well as various remote geographical sites.

Testing focuses on performance, handling qualities and flight characteristics, systems performance, reliability, maintainability, operator maintenance and documentation, human factors engineering, and system safety. It also involves the evaluation of systems such as life support, armaments, avionics, countermeasures, ground support, targeting, and flight simulation.

The ATTC fleet of 17 rotary and fixed wing test-bed aircraft are representative of the Army's fielded aviation systems and can be specially equipped and instrumented to test components and subsystems from multiple on-board computer workstations.

This reduces the flight-testing time and speeds up system development. Technical engineering data is recorded and transmitted to ground stations for real-time or post-flight analysis.

Facilities and Support

Home-based at Cairns Army Air Field (CAAF), the Test Center enjoys a total of 206,000 square feet in building space and full access to two hard-surface runways and numerous airfields. Fort Rucker's flying area covers approximately 32,000 square miles. Cairns also has a tethered hover pad and a calibrated slope-landing area. Maintenance facilities include three hangars and 12 support shops. Engineering, headquarters, and support facilities account for the remainder of the 36 buildings at Cairns.

ATTC conducts tests throughout the continental United States. When specific test capabilities or climatic conditions are required, ATTC teams conduct tests at various remote geographical sites or at DoD MRTFB.

Tests

Testing highlights for Fiscal Year 2003 include:

- Lead-the-Fleet Flight Safety Program (AH-64A/D, CH-47D/F, UH-60A/L)
- AH-64D Longbow Airworthiness and Flight Characteristics Evaluation
- AH-64D Longbow Risk Reduction
- CH-47F Reliability
- OH-58DR Stability and Control Augmentation System Optimization
- OH-58D Control and Display System, Version 4
- UH-60—Army Airborne Command and Control System—Preliminary Airworthiness Evaluation
- RAH-66 Comanche Combined Test Team
- Flight testing associated with Operation Iraqi Freedom
- Flight testing associated with the war on terrorism

Future

In Fiscal Year 2004, ATTC will test the Modernized Target Acquisition/Designation Sight for the Army's Apache/Longbow Apache attack helicopter fleet. Concurrently, ATTC will continue to test Longbow Apache upgrades. It will also continue testing the RAH-66 Comanche. As a member of a Combined Test Team, ATTC will conduct flight testing in the UH-60M Blackhawk. The Center also will test a variety of aircraft modifications, including the Firehawk fire suppression system mounted on UH-60L aircraft. ATTC will also begin test planning to support the Aerial Common Sensor Program. Pending the availability of test aircraft, ATTC will use the CH-47D-mounted Helicopter Icing Spray System to conduct icing-qualification testing in artificial as well as natural conditions. ATTC will continue to execute its flight safety program for AH-64A/D, CH-47D/F, and UH-60A/L aircraft by collecting reliability data at an accelerated operational rate in a variety of demanding environmental conditions.

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*"Bearcat Three," piloted
by experimental test pilots,
hovers above the High
Falls test area near CAAF.
"Bearcat Three" is the
Army's first CH-47F.
(Photo by Paul Reynolds)*



Dugway Proving Ground

Introduction

The U.S. Army Dugway Proving Ground (DPG) serves as the nation's chemical and biological defense proving ground. Home to the West Desert Test Center, it is a large, remote closed post on 798,855 acres of land in the Great Salt Lake Desert—about 85 miles southwest of Salt Lake City, Utah. Established March 1942, Dugway employs about 1,200 military, government civilians, and support contractors.

Capabilities

Dugway's primary mission is testing the Chemical and Biological (CB) defense systems of the United States and its allies, and testing the Nuclear, Biological, and Chemical contamination survivability of defense materiel. With more than 50 years of experience, the proving ground uses state-of-the-art laboratories, chambers, and extensive field-test grids to determine the performance characteristics of test items. Other significant core missions include:

- CB weapons conventions support
- CB defense model development and validation
- Testing of environmental characterization and remediation technology
- World-class support for meteorological and atmospheric transport modeling
- Testing of smoke and obscurant systems and illumination devices

Facilities and Support

The Lothar Salomon Life Sciences Test Facility boasts 32,000 square feet of multifunctional biology laboratories. It is the only Department of Defense facility equipped to test with aerosolized Biosafety Level-3 (BL-3) agents. The BL-3 containment suites cover 3,000 square feet of the facility. Dugway tests protective clothing and equipment, biological detectors, and decontamination systems using simulants, pathogens, or toxins. Only simulants are used outdoors.

The Melvin Bushnell Materiel Test Facility is the world's largest environmentally controlled containment chamber, supporting indoor testing of large-scale military vehicles and equipment in hazardous environments. The facility's Multipurpose Chamber can accommodate any military equipment that meets NATO shipping requirements.

The modern 35,000-square-foot Reginald Kendall Combined Chemical Test Facility supports testing of protective clothing and masks, detectors, and decontamination systems using chemical agents as challenge materials. The 52 fume hoods and 27 surety-capable test suites are used for laboratory tests and support chamber and field tests.

The Four-Dimensional Weather System, developed by Dugway in collaboration with the National Center for Atmospheric Research, highlights meteorological modeling. It includes the highest-resolution operational mesoscale modeling system in the world. The proving ground has extensive ranges and grids for artillery, smoke, obscurants, and illumination testing, as well as a state-of-the-art command center.

Dugway's Virtual Proving Ground (VPG) will revolutionize how the West Desert Test Center tests products. The plan is to develop comprehensive testing procedures that can increase DPG's current test capabilities. VPG will add modeling, simulation, and networking technologies that will provide better and faster test support at a lower cost.

Tests

Testing highlights include:

- Joint Biological Point Detection System
- Joint Biological Early Warning System
- Critical Reagents Program
- Biological Technology Characterization by Unconventional Signatures
- Restoration of Operations Advanced Concept Technology demonstration
- Protective Suit System and swatch testing
- Assembled Chemical Weapons assessment
- Joint Services Lightweight Standoff Chemical Detection



A DPG staff member works inside a chamber in the 32,000-square-foot Lothar Salomon Life Sciences Test Facility. (Photo by Al Vogel, DPG)

Future

The proving ground is gaining local and national attention as an ideal training site for federal, state, and local emergency-management and response organizations.

Dugway will continue to provide real-time meteorological analysis and near-term forecasts to the Defense Threat Reduction Agency and Department of Energy.

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Electronic Proving Ground

Introduction

The U.S. Army Electronic Proving Ground (EPG) at Fort Huachuca, Arizona, is part of the Department of Defense Major Range and Test Facility Base and is the Army's premier organization for testing command, control, communications, computers, and intelligence (C4I) equipment and systems. EPG has access to the 76,000 acres of the post, as well as selected government and private land. EPG also has field offices at Fort Hood, Texas, and Fort Lewis, Washington.

Capabilities

EPG's remote location and an environment free of radio-frequency interference make it the principal Army Test Center for communication and electronic systems, including the developmental testing of C4I systems, unmanned aerial vehicles (UAVs) and navigation and avionics systems. EPG is capable of testing systems distributed to diverse locations, emphasizing system-of-systems tests. EPG's Virtual Electronic Proving Ground allows for testing in a combination of real, virtual, and constructive environments.

Its customer base includes Army Program Managers, other military services, foreign governments, and U.S. industry. EPG personnel are well trained in radio frequency technology, software development and testing, and hardware design and production. Capabilities include:

- Performance testing of C4ISR systems from the component to a system-of-systems
- Distributed system-of-systems testing
- Electromagnetic compatibility and vulnerability of tactical electronic equipment
- Intra/interoperability of tactical, automated C4I systems
- Electronic countermeasures
- Mobile test instrumentation

Facilities and Support

EPG has developed a suite of test instrumentation that includes distributed-systems test control, test stimulation, test-data acquisition, embedded instrumentation, and virtual jamming. It is the Army's tester for unmanned/micro aerial vehicles and has extensive capabilities for Global Positioning

*The Stryker command vehicle is prepared for testing at the Electronic Proving Ground.
(Photo by Tywanna Sparks, EPG)*



System (GPS) testing, propagation simulation, C4I battlefield emulation, and the use of existing battle simulations in test and training activities. EPG maintains a full-service range and can track and collect data from all types of air and ground systems. Test capabilities include the full spectrum of electronics testing. EPG test facilities include:

- C4I Test Bed
- Antenna Test Facility
- Environmental Test Facility
- Fabrication Facilities
- EMI/EMC/TEMPEST Test Facility
- Test Control Facility (TCF)
- GPS Test Facility–Antenna Test Facility
- COSPAS-SARSAT Test Facility
- Information Assurance Test Facility

TCF provides capabilities for distributed-systems testing. This is achieved with EPG's C4I Test Toolkit and with position location via radar, Position Location System technology, air surveillance and control, and meteorological monitoring.

Tests

During EPG's 49 years, it has tested most of the Army's major C4I and electronic warfare systems. Examples include:

- Force XXI Battle Command Brigade and Below
- Stryker
- Army Airborne Command and Control System
- Joint Tactical Radio System
- Enhanced Position Location Reporting System
- Suite of Integrated Infrared Countermeasures
- Single Channel Ground and Airborne Radio System
- GPS
- Prophet (signals intelligence and electronic warfare system)
- UAVs

EPG is participating in efforts to support the Army's Brigade Combat Team, part of Army Transformation. EPG is currently responsible for C4I-related safety testing and will in the future be responsible for ensuring that the C4I systems in the Stryker armored vehicle are properly installed and functional.

Future

EPG is embarking on an internal transformation that will provide an improved capability to support system-of-systems tests on the ground at Fort Huachuca, at remote sites such as the National Training Center and Fort Polk, Louisiana, and in a distributed fashion with multiple tests and training sites. This transformation includes the ongoing upgrade of EPG-developed instrumentation, the development and adaptation of Virtual Proving Ground simulations and techniques, and the restructuring of organizational components and available technical skills.

Future activities are firmly centered on the development of the network-centric Future Combat Systems, the current Stryker development, and the individual components of the Objective Force's future communications systems.

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Redstone Technical Test Center

Introduction

Redstone Technical Test Center (RTTC), on Redstone Arsenal in northern Alabama, is the Army's foremost tester of small rockets, missiles, and weapon components and subsystems. For more than 50 years, testing at RTTC has been an integral part of the Army's missile and rocket programs. RTTC is also one of the Army's chief technical testers for aviation subsystems and components, and its expertise in testing lightning's effects on explosive and hazardous materials is recognized throughout the Department of Defense. Located in the foothills of the Smoky Mountains, the Test Center enjoys a temperate climate suitable for year-round testing.

Capabilities

RTTC's state-of-the-art laboratory and range capabilities constantly evolve to meet the needs of customers. The test expertise and experience of RTTC engineers and technicians are of the highest quality. The responsiveness to changing customer needs is a major reason this Test Center has attracted and maintained its large client base. Its facilities are designed for rapid test reconfiguration with minimal customer expense and maximum scheduling flexibility.

It has unique capabilities for testing both inert and explosive components. Extensive laboratory and range test capabilities provide an effective means of verifying component, subsystem, and system performance before flight-testing. As the only lightning-effects tester of explosive items worldwide, RTTC operates the Army's largest static rocket-motor test facility. It offers complete test capabilities for small rocket and missile systems, including flight, warhead, and motor performance.

The Test Center tests the airworthiness of Army aircraft components and subsystems for safety, qualification, and reliability. It performs all types of environmental and electromagnetic environmental-effects testing and tests sensor systems such as radars and electro-optical components under simulated battlefield conditions that include obscurants and countermeasures.

RTTC is at the forefront in developing and implementing technologies that will link its test capabilities with customers, prime contractors, and other test organizations. Test networks for collaboration and integration, and automated data collection and archival through a commandwide common infrastructure, provide optimal conditions for testing individual systems and system-of-systems.

A Soldier at RTTC uses hardware "in the loop" to simulate firing the Javelin missile at a target vehicle projected by computer equipment at White Sands Missile Range, New Mexico. (Photo courtesy of RTTC)



Facilities and Support

RTTC test and test-support services are available to government agencies, allied nations, and private industry. Support services include engineering and enhanced testing with integrated modeling and simulation. RTTC has facilities and support services to test:

- Small Rockets and Guided Missile Systems
- Aviation Components/Subsystems
- Sensor/Seeker/Designators
- Rocket Motor Static-Fire
- Electromagnetic Environment and Lightning Effects
- Systems in Natural and Induced Operating Environments
- Airborne and Field Sensors
- Warhead and Fuzes by Static or Dynamic Testing
- Developmental Components and Subsystems for Quality Assurance and Acceptance

The diverse technical, research, and engineering organizations at Redstone give RTTC access to additional test facilities and technical resources.

Tests

Some recent test programs at RTTC include:

- Common Missile
- Javelin Anti-Armor System
- Hellfire/Longbow Missile
- Patriot Missile
- Theater High Altitude Area Defense Missile
- Comanche Helicopter
- UH-60L Blackhawk
- AH-64 Apache
- Tactical Unmanned Aerial Vehicle
- Unmanned Ground Vehicle



The main charge warhead of a Javelin missile detonates upon impact with a T72 tank hulk at RTTC's Test Area I Flight Range. (Photo courtesy of RTTC)

Future

RTTC continues to evolve to meet the rapidly changing requirements associated with the high-tech weapon systems being developed by the Army. This Test Center continues to be recognized as one of the Army's foremost centers for using modeling and simulation in developmental testing. RTTC will continue to meet Army requirements for testing the advanced weapon systems designed for future battlefields.

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White Sands Missile Range

Introduction

White Sands Missile Range (WSMR), home to White Sands Test Center, is where the United States entered both the atomic and space ages. On July 16, 1945, the world's first atomic bomb was successfully tested at its Trinity Site. There, the United States launched the earliest rockets into the upper reaches of the Earth's atmosphere. Established July 9, 1945, the missile range is in the Tularosa Basin of south-central New Mexico. At 3,200 square miles, the range is the largest military installation in the country, and it can also add another temporary 2,400 square miles for tests needing more area. The headquarters area is 20 miles east of Las Cruces, New Mexico, and 45 miles north of El Paso, Texas.

Capabilities

WSMR provides test, evaluation, research, analysis, and other technical services to the Army and the Department of Defense, from the developmental stages to the end of the system. The premier open-air/overland test range and its laboratories make White Sands a one-stop test location. Test capabilities include:

- Air defense
- Smart weapons
- Fire support
- Nuclear effects
- Air-to-surface
- Air-to-air
- Space
- Aerial Cable Test Range

Facilities and Support

The range has more than 1,500 precisely surveyed instrumentation sites with many types of optical and electronic instrumentation and laboratory test facilities. Mobile and fixed instrumentation systems include:

- High-speed cameras
- Tracking telescopes
- Interferometer systems
- Radars
- Telemetry tracking and receiving stations

Computer systems process and correlate the volumes of data to provide scientists and engineers with timely and reliable performance records.

Other range services include calibration, communication, meteorology, photography, television, aerial target support, and relatively easy and fast recovery of test items to facilitate evaluation. Laboratory testing facilities include:

- Nuclear environments
- Weapon systems and test simulations
- Guidance and control propulsion
- Climatic
- Metallurgical
- Microbiological
- Dynamics
- Electromagnetic radiation effects
- Chemistry

Tests

Several noteworthy tests were accomplished recently, including:

- Guided Multiple Launch Rocket System
- High Mobility Artillery Rocket System
- Navy's Standard Missile
- Stryker
- Joint Air-to-Surface Standoff Missile
- Patriot Missile
- Advanced Medium Range Air-to-Air Missile
- Unmanned Aerial Vehicle
- Laser destruction of artillery rounds

White Sands also has the facilities necessary to conduct some types of operational tests. On February 16, 2002, WSMR fired a Patriot Advanced Capability-3 (PAC-3) missile at a missile target, and it simultaneously fired two PAC-2 missiles at a subscale aircraft and full-scale aircraft that were emitting radar-jamming signals. Six vehicles were in the air at the same time during this test, which required most of the range's optics, telemetry, and radar assets.



*A Line-of-Sight
Anti-Tank Missile test is
conducted at WSMR.
(U.S. Army Photo)*

Future

WSMR has made the transition to a new state-of-the-art range-control facility. This upgrades testing of air-and missile-defense systems, ground-attack systems, air-to-air systems, air-to-ground systems, and direct-energy systems. White Sands is also leading the way in joint interoperability testing as well as combined developmental and operational testing. White Sands continues to support NASA's space shuttle pilot-training program in anticipation of a return to flight in 2004. Preparations are also under way for testing the Air Force's Airborne Laser over the missile range.

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Yuma Proving Ground

Introduction

Originally established in 1943, Yuma Proving Ground (YPG) in Arizona is responsible for managing testing at three locations: the Yuma Test Center (YTC) at YPG, the Cold Regions Test Center, Alaska, and the Tropic Regions Test Center, which is headquartered at YPG and operates in Hawaii and other tropic areas. Three of the four extreme natural environments recognized as critical in testing military equipment—desert, cold, and tropic—fall under the management of YPG. YTC is a multipurpose test facility able to test nearly every weapon system in the ground-combat arsenal. More than 1,300 square miles in size, the Test Center is one of the few places where military munitions and hardware can be tested in an area almost completely removed from urban encroachment and noise concerns. Its sunny climate, terrain, and excellent range facilities add up to almost perfect testing and training conditions.

An AH-64D Longbow Apache helicopter outfitted with a Target Acquisition Designation Sight fires rockets over Cibola Range. (U.S. Army Photo)

Capabilities

Yuma Test Center capabilities include:

- Ground weapons systems, from small arms to long-range artillery
- Helicopter armament and target acquisition systems
- Artillery and tank munitions
- Cargo and personnel parachutes, including guided systems technologies
- Mines and mine-removal systems
- Tracked and wheeled vehicles in a desert environment
- Vibration-free, interference-free tests of smart weapon systems at the Smart Weapons Test Complex
- Laguna Army Air Field complex, featuring two runways—6,000 feet and 5,150 feet in length
- Nuclear Regulatory Commission license for firing depleted uranium ammunition, for direct-fire weapons at multiple ranges

Facilities and Support

YTC's Kofa overland artillery range extends 55 miles, making it the longest such range in the nation. The Cibola Range incorporates 840 square miles of controlled restricted airspace over highly challenging terrain, allowing helicopters a 360-degree field of fire. More than 200 miles of improved road courses provide grueling testing of tracked and wheeled military vehicles. The Test Center offers the most modern mine, countermine, and demolitions test facility in the western hemisphere.

YTC's instrumentation is state of the art. With a fiber-optic backbone, YPG is able to acquire, reduce, and transmit a nearly unlimited amount of test data. Wide-band networking permits materiel and combat developers to view video feeds from test sites at their home locations along with near real-time data reduction of selected test parameters. High-speed telemetry systems placed on such diverse combat systems as projectiles and helicopters, when coupled with YTC's real-time system, allow for complete control and monitoring of ongoing testing. New investments in modeling and simulation will continue to enhance YTC's ability to support the Army's Transformation plan. They will leverage the





The Mongoose mine clearing system is tested at versatile Yuma Proving Ground. (Photo courtesy of YPG)

power of modeling and simulation to provide integrated, reusable, reliable, and cost-effective testing.

The proving ground is making significant progress in developing and using the Hardened Sub-Miniature Telemetry Sensor System and Two-Way Robust Acquisition of Data for use in acquiring and communicating data on tested projectiles while in flight.

Tests

Examples of the Test Center's defense contributions are numerous. About 100 tests take place at any one time. Examples include:

- XM777 155mm Lightweight Howitzer
- Stryker Combat and Combat Support Vehicles
- Advanced Tactical Parachute System
- Army and Navy Unmanned Aerial Vehicles
- AH-64D Longbow Apache Helicopter
- RAH-66 Comanche Helicopter
- M1A2 Abrams Tank
- Bradley Fighting Vehicle
- Extended Range Artillery and Tank Munitions
- Countermine and Mine Systems
- Palletized Loading System and Family of Medium Tactical Vehicles
- Hellfire, Stinger, Maverick, and Brimstone missiles fired from helicopters
- Advanced Precision-Kill Weapons System and Common Missile System to meet next-generation missile system requirements

All the primary ground weapon systems deployed to Saudi Arabia for Operation Desert Storm and Operation Iraqi Freedom underwent exhaustive tests at YTC. Numerous tests are supporting our troops in the Persian Gulf area.

Future

As it meets the challenges of the new century, YPG and YTC will play a vital role in partnering with other government agencies, private industry, and academic organizations to enhance the technical excellence and high quality of America's military arsenal.

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Cold Regions Test Center

Introduction

Located in the heart of Alaska, the U.S. Army Cold Regions Test Center (CRTC) is the premier cold-weather test facility within the Department of Defense. The Test Center offers access to more than 670,000 acres of range, controlled airspace, support facilities, and consistently cold weather. The winter climate is characterized by periods of below-zero temperatures that last from several days to several weeks, with lows occasionally plunging to minus 50 degrees Fahrenheit. The Test Center offers a full range of test capabilities and the professional expertise for all cold-weather test operations.

Experience in the cold-weather testing of military equipment has shown that such testing requires at least a six-hour block of time in which the ambient temperature remains within test guidelines. CRTC has 10 times more of these periods than winter test sites in the lower 48 states. CRTC provides the synergistic effects of temperature, wind, and snow in an area large enough to truly represent winter warfare. The CRTC environment allows for mobility, maneuver, and direct-fire and indirect-fire testing that

cannot be duplicated in environmental chambers. Additionally, limited winter sunlight provides extended test periods for night-vision systems while temperate conditions and nearly 24 hours of light provide excellent conditions for summer testing.

Capabilities

CRTC professionals test an astonishing variety of items, including:

- Combat and tactical vehicles
- Infantry and special operations weapons
- Ammunition
- Missiles
- Clothing
- Power generation and decontamination equipment
- Direct-fire and indirect-fire weapons

Many fielded items incorporate CRTC-generated modifications that improve cold-weather performance.



CRTC offers nearly ideal conditions for testing systems in severe cold weather. (U.S. Army Photo)

Facilities and Support

CRTC is an invaluable testing location because of its long experience in combining developmental and operational testing, traditionally performed separately at most other locations. CRTC has always used Soldiers from tactical units to operate equipment or wear specially designed cold-weather clothing during tests, a natural combination. A variety of CRTC facilities support testing:

The Bolio Lake Test Complex—This is the hub for all testing at CRTC. It contains the cold-start engine test facility as well as large maintenance and storage facilities, and it is the administrative center for all tests. CRTC tests at several areas on Fort Wainwright or in the vicinity, depending on test requirements.

Firing Ranges—Eight ranges are used for tests associated with small arms, direct fire, artillery, and explosives.

Military Operations in Urban Terrain (MOUT)—CRTC has access to MOUT facilities located on Fort Greely for testing small arms.

Allen Army Air Field—Within season, all U.S. military aircraft can be accommodated at the air field.

Tests

CRTC is capable of a wide variety of tests. Recent tests have included:

- Stryker Combat and Combat Support Vehicles
- M1A2 Main Battle Tank
- M2A3 Bradley Fighting Vehicle
- Hybrid Electric HMMWV
- Force XXI Battle Command Brigade and Below
- Armored Security Vehicle
- Joint Chemical Agent Detector
- Javelin Anti-Tank Missile System
- USMC Predator Unmanned Aerial Vehicle
- Commercial testing for General Motors and TRW
- Family of Medium Tactical Vehicles
- Soldier equipment
- Environmental storage tests



CRTC, in Alaska with its consistently frigid winters, makes it a good place for Soldiers to get winter training. (U.S. Army Photo)

Future

Planned future construction will upgrade automotive test capabilities, with a focus on hybrid electric technologies, improved instrumentation and data collection capabilities, and new test-support facilities located at various test sites. Upcoming tests include the extended range TOW, XM777 155mm Lightweight Howitzer, High Mobility Artillery Rocket System, Stryker combat vehicle, Mongoose mine clearing system, XM8 infantry rifle, and Hybrid Electric M113 personnel carrier.

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Tropic Regions Test Center

Introduction

The Tropic Regions Test Center (TRTC), headquartered at the U.S. Army's Yuma Proving Ground (YPG), Arizona, provides customer services in Hawaii and other tropic areas, where it conducts tests on a wide variety of military weapon systems, materiel, and equipment. The primary tropic-test facility is in Hawaii, with the principal site at Schofield Barracks. TRTC also oversees testing in Panama and other tropic areas, depending on the needs of each individual test program.

The Army began systematic tropic-environment testing in the Panama Canal Zone during World War II, with more than 300 people assigned to that mission during the busy Vietnam War days. The organization has since been downsized, reconfigured to operate in a wider geographic area and placed under the command of YPG.

Testing in the tropics is essential because environmental aggressors such as heat, humidity, solar radiation, insects, fungus, bacteria, rainfall, and other factors combine to rapidly reduce the performance of people, machines, and materials. The unique combination of tropic conditions in Hawaii and other sites means managers can plan and conduct tests where they are most realistic and true to life.

Capabilities

TRTC planners are extensively involved with combined developmental and operational testing, often working with Soldier equipment. Current and planned test capabilities in Hawaii include:

- Soldier systems test sites
- Corrosion testing at fixed facilities
- A MANPACK portability course
- Exposure cages
- Firing range access
- Small caliber weapons firing
- A suite of sites located elsewhere in the tropics than Hawaii, to meet additional tropic-test capability needs

Facilities and Support

TRTC offers a diverse number of testing sites to meet the environmental testing needs of customers now and in the future. Support and infrastructure include:

- Troop support from the 25th Infantry Division on a case-by-case basis
- Facilities and other services from the 25th Infantry Division (vehicles, meteorological data, geodetics and other surveying data, etc.)
- Office complex at Schofield Barracks
- Test contractor support at all test sites

Future

Future test operations will involve dual-use, off-the-shelf technologies with military and civilian applications, such as advanced sensors with multiple-application capabilities. There will be multinational cooperative efforts to gather and share information of mutual interest. Innovative partnerships currently being negotiated with agencies and universities, in the United States and elsewhere, will allow customers to leverage capabilities across a wide range of sites and borders. This will provide a tropic test capability that is second to none. Tropic test facilities are currently being established over a wide geographic area.

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Soldier systems of all kinds undergo thorough testing at TRTC in Hawaii and other tropic areas. (U.S. Army Photo)



Operational Testing

U.S. Army Operational Test Command— The Army's Only Independent Operational Test Organization

As the U.S. Army transitions to a force for the 21st Century, so does the Army's only independent operational test organization, the U.S. Army Operational Test Command (OTC) at Fort Hood, Texas, as it independently validates each new item of equipment.

OTC has the mission to conduct realistic operational testing in the critical areas of equipment, doctrine, force design, and training. Operational tests conducted by the Command are required by Public Law and provide significant data to Army decision makers on key systems and concepts.

Located with OTC Headquarters Command and staff, on West Fort Hood, is the Test and Evaluation Support Activity and five of OTC's 10 test directorates. Five test directorates are located off-site. A Test and Evaluation Coordination Office is also maintained at Fort Leonard Wood, Missouri.

While many tests are conducted at Fort Hood with its large Soldier population, test teams will deploy anywhere in the world to accomplish their mission. OTC's objective is to conduct the operational tests where the Soldiers are.

While land warfare and Soldiers are the focal point of the Army mission, strategic deployment to get land forces to the battlefield is also important. OTC has several joint service operational tests ongoing to satisfy this requirement.

OTC becomes involved in the Army's acquisition process following developmental tests that ensure the product does what the Army expected it to do. That product is then handed off to OTC to test in the hands of the intended user—the Soldier.

OTC uses highly sophisticated and state-of-the-art technology, both instrumentation along with modeling and simulation, to collect test data that will document performance levels and operational suitability.

Army Transformation has prioritized technology in the business of operational testing and in June 2002, a new directorate was formed to centralize all the technological capabilities used in operational testing.

OTC's Transformation Technology Directorate (TTD) is charged with predicting future technologies while, at the same time, providing current technology expertise to test teams. TTD is responsible for accrediting/certifying technology for specific applications, monitoring technology during use in tests and experiments, and performing System Manager responsibilities for development and acquisition of technologies.

A mainstay of the instrumentation systems used is OASIS (OTC Analytic Simulation and Instrumentation Suite) that integrates modeling and simulation tools with test instrumentation for the common objective of supporting operational testing.

OTC conducted the IOT of the Stryker Brigade Combat Team in 2003 and has been involved in the medium armor Transformation effort since 1999. (Photo by Tad Browning, OTC Test Documentation)





The Army's Future Combat Systems (FCS) is a high priority program for OTC in all mission areas. Operational testing on the FCS program will begin with a comprehensive series of small, focused, operationally realistic limited user tests that will assist in the development process and build toward the Initial Operational Test (IOT). Given the nature of FCS, the IOT will be a relatively large and complex event, and should be the means to assess the interoperability of FCS components and the most global operational issues.

From independent operational testing of entrenching shovels to Ground-Based Midcourse Defense and on into FCS, the underlying philosophy that guides OTC's mission is "TRUTH IN TESTING."

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A test player locates a mine during a test at Yuma Proving Ground, Arizona, of the Handheld Standoff Mine Detecting System as a data collector and surveyor from the Engineer and Combat Support Test Directorate look on. (Photo by Sherman Hogue, OTC Test Documentation)

Airborne and Special Operations Test Directorate

OTC's most unique test directorate is the Airborne and Special Operations Test Directorate (ABNSOTD) at Fort Bragg, North Carolina.

A direct descendant of the original parachute test platoon in 1940, this Directorate is not only responsible for the testing of new parachutes and airborne equipment, but also is chartered to certify every item of Army equipment to be airdropped, airlifted, sling-loaded, or in any way transported or delivered by Army or Air Force aircraft.

Certification, for every class and type of aircraft for airdrop of personnel and equipment, including new military, foreign, and commercial aircraft, comes as a result of testing by this Directorate and is finalized with the publication of approved airdrop rigging procedures in the appropriate technical and training manuals.

Directorate personnel conduct operational airdrop testing, using sophisticated data collection instrumentation, to validate rigging procedures and ensure that the dropped equipment functions properly when employed on the ground.

Directorate personnel also perform extensive testing of Soldier equipment to be employed in airborne operations, ranging from new personnel parachute systems to any new or modified combat equipment or individual weapons systems. The first Soldiers to jump with a new item of equipment, or utilize a new procedure, will be the troopers assigned to the directorate before any operational testing by a regular airborne unit.

The ABNSOTD Military Free-Fall Section tests numerous state-of-the-art components and procedures directly related to Special Operations Forces (SOF) infiltration and exfiltration requirements to meet both present day immediate operational needs and those of the future. These tests directly impact current and future SOF doctrine and deployment capabilities.

"Testing without documentation or measurement is opinion" according to the professionals in the Instrumentation Division. From a ground-based, high-tech video tracking system to aerial photography from fixed or rotary wing aircraft, every possible visual action from exit to ground recovery is recorded.

The Electronics Branch uses state-of-the-art instrumentation placed on test jumpers or test loads to indicate and record specific test data as directed by the test officers. Data includes G-force opening shock load, heavy drop load force transfer, pitch-roll-yaw, and time-coded positional data.

ABNSOTD has the critical responsibility to provide dynamic, responsive, and quality testing in order to meet the needs of the airborne and special operations communities.

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*The Original
Parachute Test
Platoon, 1940, and
ABNSOTD Airborne
Test Jumpers, 2003.
(Photo by Harold
Dixon, ABNSOTD
Videographer)*



Air Defense Artillery Test Directorate

The Army's premier air and missile defense independent operational tester is the Air Defense Artillery Test Directorate (ADATD) at Fort Bliss, Texas.

Covering the full spectrum of tests, from Force Development Test and Experimentation or Initial Operational Test (IOT) to Limited User Test and Customer Tests, ADATD also participates in Advanced Warfighting Experiments and joint testing.

With extensive live-fire range capabilities and maneuver area comprising approximately 937,000 acres bordering White Sands Missile Range, New Mexico, ADATD has conducted missile and gun live-fire tests of the TOW, PATRIOT, Avenger, HAWK, Army Tactical Missile System, Stinger, Bradley Linebacker, MLRS, and the Forward Area Air Defense System. ADATD also has the capability to use non-eye safe lasers up to 30 kilometers.

With unlimited ceiling and controlled airspace to fly unmanned aerial vehicles and realistic aircraft threat profiles for air and missile defense testing, and the ability to intercept ballistic targets, ADATD is able to collect required data for independent operational test and evaluation of weapons systems. ADATD employs highly sophisticated and state-of-the-art instrumentation in its test data collection efforts.

Equipment capabilities include a wide range of new state-of-the-art Global Positioning System tracking systems, as well as older reliable Nike Hercules radars and safety surveillance radar capable of tracking up to 50 targets. A mobile command post, combined with a fixed-site command post at Oro Grande, provides the capability of conducting and controlling two tests simultaneously; a mobile radio frequency monitoring system to identify radio frequency sources that may interfere with ADATD instrumentation system and systems under test; and a C3I Engineering and Evaluation System that provides interactive and scripted scenario-generation capabilities for up to 2,000 data link tracks and simulated radar objects, which provides a common air picture to supported tactical data system interface units.

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DSN: 978-4910

Web site: www.otc.army.mil/adatd/index.htm



Tested by ADATD, the Surfaced-Launched Advanced Medium Range Air-to-Air Missile uses a High Mobility Multipurpose Wheeled Vehicle as the transporter. (U.S. Army Photo)

Aviation Test Directorate

“Fidelis Operanti” (fidelity to the operator) appropriately states the commitment of the Aviation Test Directorate (AVTD) to the aviation Soldier.

Based at West Fort Hood, Texas, the Directorate maintains a close working relationship with the U.S. Army Aviation Center, evaluators, various combat arms proponents, materiel developers, technical test community, and Battle Labs.

The AH-64D Longbow Apache operational test was the largest and most complex Army aviation test in history.

For the nine RAH-66 tests, AVTD test members participate as members of a “Combined Test Team” composed of representatives from industry and technical testers. The combined team is expected to save tax dollars and leverage each organization’s skills, experience, and expertise. When the Initial Operational Test (IOT) of the Comanche is completed in 2009, Army Aviation history will have been rewritten.

AVTD is in the planning stages for operational tests of the UH-60M Blackhawk and the CH47F Chinook Cargo helicopter, which utilizes emerging technology designed for the Army’s Objective Force on the digitized battlefield.

AVTD recently conducted the Block One IOT of the Air Warrior (AW) System, which comprises 17 subsystems designed to meet the mission needs of the unit and to provide a system approach to replace the current aircrew combat uniform and aviation life support equipment. Tailoring the AW system requires no special tools and can be accomplished by

individual crewmembers in less than an hour. A key addition to the system is that the microclimate cooling system is designed to provide crewmember cooling through an individual quick-release hose connection that connects the crewmember to a microclimate-cooling unit that allows crewmembers to operate up to 5.3 hours in a hot environment while in MOPP4.

Smaller tests include the Combat Survivor Evader Locator and Mobile Operating Tower System.

From the earliest test flights of the Wright Brothers to the future testing of the RAH-66, the Army has a requirement for in-depth operational test and analysis of new systems. AVTD will fulfill that critical service.

Information Contacts

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Web site: www.otc.army.mil/avtd/avtdhome.htm

*AVTD has been
involved in testing
the Air Warrior System.
(U.S. Army Photo)*



Command, Control, Communications, and Computers Test Directorate

As the Army moves toward the Future Force, sophisticated communications, information systems, and networks will be the critical enabler for every mission.

The Command, Control, Communications, and Computers Test Directorate (C4TD) at West Fort Hood, Texas, is responsible for testing the systems that will process and transmit, data, messaging, and video-information through networks at the tactical, operational, strategic, and sustaining base levels.

Composed of the Communications-Electronics Test Division and the Computer Systems Test Division, C4TD ensures these systems are effective, suitable, and survivable.

C4TD also maintains the Information Technology/Information Assurance Cell to support the testing of these systems so that vital information storage and transmission are secure, available, and protected from hostile or accidental destruction and release.

Systems that C4TD tests include the Warfighter's

Information System-Tactical (WIN-T); Joint Tactical Radio System; Joint Network Management System; Defense Travel System; Transportation Coordinators-Automated Information for Movement System II; Force XXI Battle Command Brigade and Below; Army Airborne Command and Control System; Network Security Management System; Phoenix Super-High Frequency Tri-band Terminal; Simple Key Loader; Global Combat Support System-Army; and Distributed Learning System.

C4TD professional testers remain on the leading edge of communication and information technology to ensure that there is "value added" to systems introduced to the Army within their mission area.

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C4TD tests sophisticated systems, like the Army Airborne Command and Control System workstation in the right corner. (U.S. Army Photo)

Close Combat Test Directorate

The warrior test directorate of OTC is the Close Combat Test Directorate (CCTD).

Headquartered at Fort Hood, Texas, CCTD is responsible for operational testing of armor and infantry systems and is the lead OTC test directorate responsible for operational testing of the weapons and systems of the Army's Transformation force.

While continuing to conduct operational tests of upgrades in the current force, such as the M1A2 SEP and the Bradley M2A3, CCTD testers began their work with the Transformation force during the Initial Brigade Platform Performance Demonstration at Fort Knox, Kentucky, in January 2000, as well as supporting the trainup of the initial brigade in 2001. The first operational test on the Interim Armored Vehicle, now named Stryker, was in September 2002 at Fort Lewis, Washington, and the Infantry Carrier Vehicle initial test was at Fort Knox in the summer of 2003.

This Directorate has also conducted joint testing in Canada with the Canadian Forces, utilizing the latest in instrumentation technology for collecting scientific data from the LAV III in a tactical environment.

CCTD testers are also planning for the Fiscal Year 2004 conducting of operational tests of the Mortar Fire Control System, Line-of-sight Anti-tank weapons system, Mortar Carrier B, and Land Warrior.

CCTD embodies the OTC philosophy of "Our ultimate customer is today's American Soldier."

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Web site: www.otc.army.mil/cctd/cctd_frame.htm



CCTD tests armor and infantry systems for OTC, including this past test of the Thermal Weapons Sight. (Photo courtesy of OTC)

Engineer and Combat Support Test Directorate

The most versatile of OTC's test directorates is the Engineer and Combat Support Test Directorate (ECSTD), located at Fort Hood, Texas.

ECSTD test teams conduct operational tests in the mission areas of Combat Engineer, Chemical, Transportation, Military Police, Quartermaster, Ordnance, Chaplain, and Medical Service. ECSTD testers work closely with the Maneuver Support Center at Fort Leonard Wood, Missouri, and the Combined Arms Support Command at Fort Lee, Virginia.

Many of the tests conducted by ECSTD are joint service such as the Joint Chemical Agent Detector, Joint Service Light Nuclear, Biological Chemical Reconnaissance System, or multiservice operational tests such as the Strategic Sea Lift Program and Theater Support Vessel transport ships.

For the Combat Engineers, ECSTD test teams have tested the High Mobility Engineer Excavator, Standoff Mine Detecting System, Dry Support Bridge, and Improved Ribbon Bridge.

In support of the Army's logisticians, ECSTD planned and/or conducted tests of the Tactical Fire Fighting Truck, Digital Topographic Support System, Forward Repair System, Base Support Test Facility-Version 5, Tactical Quiet Generators, Fifth Wheel Towing Device, and water purification systems.

ECSTD's operational testers are driven to conduct stressful, realistic operational scenarios to test the effectiveness, suitability, and survivability of new systems destined for the hands of our ultimate customer—the American Soldier.

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Web site: www.otc.army.mil/ecstd/index/htm



ECSTD conducted an operational test of the Tactical Fire Fighting Truck in 2003. Local firefighters took part in extinguishing the controlled fires. (Photo by Sherman Hogue, OTC Test Documentation)

Fire Support Test Directorate

The oldest of OTC's test directorates is the Fire Support Test Directorate (FSTD) located at the home of Field Artillery, Fort Sill, Oklahoma. FSTD is a professional, mission-focused test directorate that contributes to the Field Artillery's future successes on the battlefield of the 21st Century by rigorous testing under realistic operational conditions.

While the professional and experienced FSTD workforce is the heart of the Directorate, highly sophisticated state-of-the-art test instrumentation suites compose the nerve system.

The principal instrumentation suite, unique to FSTD and the Command, is the Fire Support Automated Test System (FSATS). This system provides FSTD with the capability to conduct corps-level testing of fire support C4 systems by simulating 75 percent of the corps' Fire Support operational facilities.

This capability, unequalled in the Command, has permitted robust, multitiered software testing at a fraction of the cost associated with having to field live player corps facilities. The FSATS is not only a simulation-stimulation system, but also is a non-intrusive data collection system with full data reduction capabilities. FSATS will soon evolve into the Extensible C4I Instrumentation System, a system even more versatile than FSATS and employing the latest in software engineering technology.

FSTD is also the owner and developer of the Multimedia Transfer System (MDTS), a system designed to fully automate test data collection and permit instantaneous data transmission from multiple test sites.

Via satellite communications, MDTS moves all types of digital data, including video, text, chat, and databases, from a remote test location to a data collection point anywhere on the Command link and return. MDTS maintains data integrity and enhances quality control, helps reduce test costs, and reduces time lag between data capture and data entry from weeks to minutes.

These systems will be used in the independent operational test and evaluation of HIMARS, Phoenix Battlefield Sensor System and future ATACMS munitions.

Taking advantage of new technology to collect and process test data will significantly enhance the Army's goal of Transformation and Field Artillery modernization to meet 21st Century threats.

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*Rigorous testing of
Field Artillery systems
by FSTD, under
realistic operational
conditions, enhances
the Army's goal of
Transformation to meet
21st Century threats.
(Photo courtesy of
WSMR)*



Ground-Based Midcourse Defense Test Directorate

Created in 2001, the Ground-Based Midcourse Defense Test Directorate (GMDTD) was established to take advantage of OTC's early involvement in the Missile Defense Agency's (MDA's) GMD program.

As the operational testing arm of GMD Combined Test Force (CTF), GMDTD is chartered to conduct a robust GMD Element Test and Evaluation program that contributes to the delivery of a credible Initial Defense Operations (IDO) capability against long-range ballistic missile attacks by September 30, 2004. In addition, the GMDTD is charged with strategically planning a test program to support maturation of GMD technologies beyond 2004. GMDTD, working alongside the GMD Joint Program Office and The Boeing Company in the CTF, develops Warfighter training products to support IDO and provides life-cycle management of the Embedded Test Capability. GMDTD is also striving to execute a fast-paced test and evaluation program with minimum duplication of effort, and reduce program risks whenever possible without compromising either developmental testing (DT) or operational testing (OT).

GMDTD/CTF conducts combined DT and OT in accordance with the GMD acquisition strategy. The GMDTD/CTF acts as the single integrated team for GMD Element level testing. Element tests include Integrated Ground Tests, Integrated Flight Tests, Pre-Mission Tests, Post-Flight Reconstruction, Risk Reduction Flights, Radar Characterization Flights, Distributed Ground Tests, and some Specialty Tests (e.g., lethality).

GMDTD is leading OTC's efforts to validate the GMD operational concept, assist in the development and deployment of an IDO capability, and aid the development of the Block 2004 Test Bed as a means of conducting operationally realistic testing. In short, the mission of the GMDTD/CTF is to verify and build confidence in overall GMD Element performance.

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*A Ground-Based Interceptor is launched as part of a combined developmental and operational test of the midcourse defense system within the MDA's program.
(U.S. Army Photo)*

Intelligence and Electronic Warfare Test Directorate

A key ingredient to the Army's Objective Force of the future is situational awareness and information dominance. The Army's tools for this are Intelligence, Surveillance, Reconnaissance (ISR), Information Assurance (IA), and Electronic Warfare (EW). The Intelligence and Electronic Warfare Test Directorate (IEWTD) at Fort Huachuca, Arizona, is committed to providing robust synthetic operational environments, along with realistic battlefield environments, to test the future ISR, IA, and EW systems of the Objective Force.

In modern-day testing, IEWTD must be concerned with how well a new item of equipment works as a system-of-systems within a C4ISR architecture, as well as test its resistance to a complex and evolving threat signal and IA environments. In most tests, these threats to the fidelity and density required of emerging IEW systems must be simulated to measure the adverse effects.

IEWTD has one test division that provides special user-testing services in the areas of ISR, EW, and intelligence processing systems. This division is responsible for testing the Army's signals and imagery intelligence, service ground and airborne

platforms, reconnaissance (manned and unmanned) aerial vehicles, sensors, and processing systems. It also provides testing support to the Intelligence and Security Command, Special Operations Command, U.S. Marine Corps, U.S. Air Force, National Security Agency, and to the evaluation of Tactical Exploitation of National Capabilities equipment and procedures.

The IEWTD Technical Division, in support of the Test Division, designs tests that provide fully instrumented threat systems, dynamic scenarios, and automated data-extraction tools to measure the systems under test. IEWTD uses a variety of instrumentation developed by the Directorate, and scenarios written by Subject Matter Experts, to fully explore the mission effectiveness, system performance, suitability, and survivability of systems. Testing is done in live, virtual, and simulated environments using the Intelligence Modeling and Simulation for Evaluation capability. The Directorate has an extensive Electromagnetic Environmental Effects (E3) threat and instrumentation capability that supports E3 assessments of C4ISR systems in an operational environment.

To ensure a common picture is provided to the Warfighter, IEWTD works closely with the Training and Doctrine Command on intelligence doctrine and on the application of high-tech solutions to intelligence distribution throughout the war space.

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*A Military Intelligence
Soldier inspects a
Shadow Tactical
Unmanned Aerial
Vehicle for
operational test flight.
(Photo by John Brady,
OTC Test
Documentation)*



Objective Force Test Directorate

Within OTC, the Objective Force Test Directorate (OFTD) is at the tip of the Transformation test spear. As such, it serves as the Command's lead in the operational testing of the Army's Future Combat Systems (FCS).

Created in 1994, and redesignated during 2002 to reflect the Transformation mission, this Directorate at West Fort Hood, Texas, was originally formed to centralize efforts of Force XXI initiatives and the proliferation of Advanced Warfighting Experiments. OFTD was chartered to project itself well into the 21st Century and assist other OTC test directorates in absorbing future technological trends in their test planning.

OFTD is responsible for operational testing of FCS and the integration of complementary systems into the system-of-systems and FCS family of systems. OFTD is the lead Directorate for OTC support to Army Transformation Experiments, Advanced Warfighting Experiments, Advanced Concepts Technology Demonstrations, and Advanced Technology Demonstrations where FCS Unit of Action, Unit of Employment, and Joint Operations are the focus.

OFTD is currently reconfiguring its structure to support the upcoming testing of FCS, which includes changes in Directorate functions. FCS is a major component in the Army's Transformation effort and the network-centric environment in which it will operate. Because of the structural complexity of FCS, it is forcing OFTD to rethink how it conducts testing. Today's current testing norms will not allow the Directorate to provide the data that will adequately answer the question, "Do networked forces outfight

non-networked forces?" Additionally, how does OFTD test Units of Action and Units of Employment equipped with these networked, modular systems capable of distributed seamless joint and combined operations over a vastly dispersed battlefield?

These challenges are the current focus of OFTD's mission. Restructuring and redefining how it tests will ensure the Directorate's success in testing the operational effectiveness, suitability, and interoperability of future individual systems.

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*OFTD will have the responsibility of operational testing of the Army's FCS, seen here in an artist's concept.
(Photo courtesy of Boeing)*



Career Opportunities

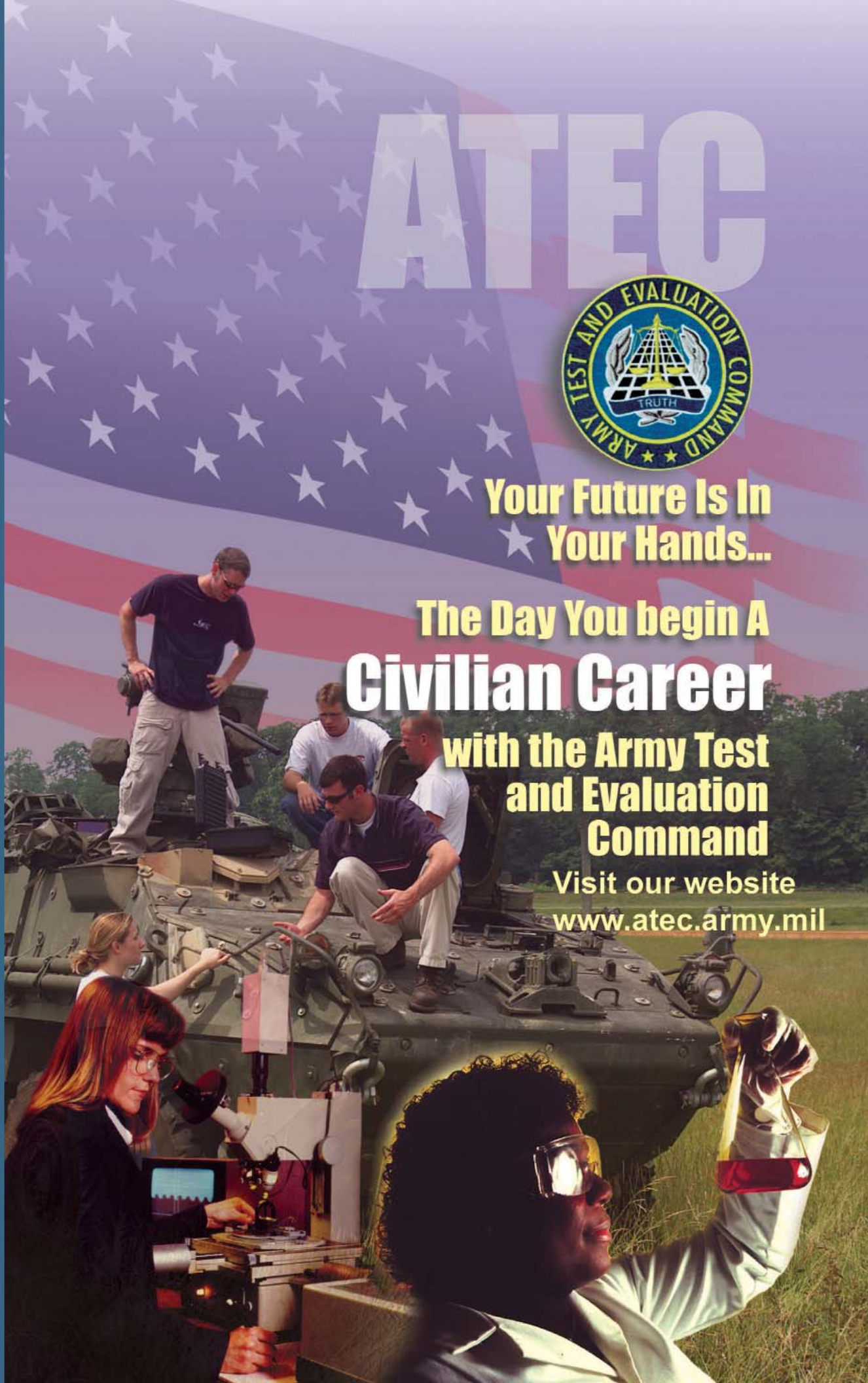
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However, some of the benefits of working for ATEC are not written. ATEC is an organization known for its uncompromising test and evaluation standards. ATEC's culture is noted for viewing the Soldier as the ultimate customer and ATEC strives to help its people advance and grow - personally and professionally.



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